

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (withdrawn): An isolated nucleic acid fragment comprising or complementary to a nucleotide sequence encoding a polypeptide having desaturase activity, wherein the amino acid sequence of said polypeptide has at least 50% sequence identity to an amino acid sequence selected from the group consisting of SEQ ID NO:20, SEQ ID NO:29, SEQ ID NO:31, SEQ ID NO:33 and SEQ ID NO:35.

Claim 2 (currently amended): An isolated ~~nucleotide sequence comprising at least 70% nucleotide sequence identity to a nucleotide sequence comprising SEQ ID NO:13~~ nucleic acid sequence encoding a polypeptide having at least 70% sequence identity to SEQ ID NO:14, wherein said nucleic acid sequence encodes a functionally active $\Delta 6$ -desaturase.

Claim 3 (cancelled)

Claim 4 (currently amended): The isolated ~~nucleotide nucleic acid~~ sequence of claim 2 wherein said ~~sequence encodes a functionally active desaturase which $\Delta 6$ -desaturase~~ utilizes a polyunsaturated fatty acid as a substrate.

Claim 5 (currently amended): The ~~nucleotide isolated nucleic acid~~ sequence of claim 2 wherein ~~SEQ ID NO:13~~ said sequence is isolated from *Saprolegnia diclina*.

Claim 6 (withdrawn): The nucleotide sequence of claim 5 wherein SEQ ID NO:28, SEQ ID NO:30 and SEQ ID NO:32 are derived from *Thraustochytrium aureum*.

Claim 7 (withdrawn): The nucleotide sequence of claim 6 wherein SEQ ID NO:34 is derived from *Isochrysis galbana*.

Claim 8 (withdrawn): A purified polypeptide encoded by said nucleotide sequence of claim 1, 2 or 3.

Claim 9 (withdrawn): A purified polypeptide which desaturates polyunsaturated fatty acids at carbon 5 and has at least about 50% amino acid identity to an amino acid sequence selected from the group consisting of SEQ ID NO:20, SEQ ID NO:29, SEQ ID NO:31 and SEQ ID NO:35.

Claim 10 (withdrawn): A purified polypeptide which desaturates polyunsaturated fatty acids at carbon 6 and has at least about 50% amino acid identity to an amino acid sequence selected from the group consisting of SEQ ID NO:33 and SEQ ID NO:14.

Claim 11 (currently amended): A method of producing a desaturase in a host cell in vitro comprising the steps of:

- a) isolating a nucleotide sequence comprising SEQ ID NO:13;
- b) constructing a vector comprising: i) said isolated nucleotide sequence operably linked to ii) a regulatory sequence;
- c) introducing said vector into a host cell for a time and under conditions sufficient for expression of said desaturase.

Claim 12 (previously presented): A vector comprising:
a) a nucleotide sequence comprising SEQ ID NO:13, operably linked to b) a regulatory sequence.

Claim 13 (currently amended): A An isolated host cell comprising said vector of claim 12.

Claim 14 (previously presented): A mammalian cell comprising said vector of claim 12, wherein expression of said nucleotide sequence of said vector results in production of altered levels of arachidonic acid (AA), eicosapentaenoic acid (EPA), gamma-linolenic acid (GLA) or stearidonic acid (STA), when said cell is grown in a culture media comprising at least one fatty acid selected from the group consisting of linoleic acid (LA), alpha-linolenic acid (ALA), dihomo-gamma-linolenic acid (DGLA) and eicosapentaenoic acid (EPA).

Claim 15 (previously presented): An isolated plant cell, plant or plant tissue comprising said vector of claim 12, wherein expression of said nucleotide sequence of said

vector results in production of a polyunsaturated fatty acid by said plant cell, plant or plant tissue.

Claim 16 (previously presented): The isolated plant cell, plant or plant tissue of claim 15 wherein said polyunsaturated fatty acid is selected from the group consisting of AA, EPA, GLA and STA.

Claim 17 (withdrawn): One or more plant oils or acids expressed by said plant cell, plant or plant tissue of claim 15.

Claim 18 (withdrawn): A transgenic plant comprising said vector of claim 12, wherein expression of said nucleotide sequence of said vector results in production of a polyunsaturated fatty acid in seeds of said transgenic plant.

Claim 19 (withdrawn): A method for producing a polyunsaturated fatty acid comprising the steps of:

- a) isolating a nucleotide sequence selected from the group consisting of SEQ ID NO:19, SEQ ID NO:28, SEQ ID NO:30 and SEQ ID NO:34;
- b) constructing a vector comprising said isolated nucleotide sequence;
- c) introducing said vector into a host cell for a time and under conditions sufficient for expression of $\Delta 5$ -desaturase enzyme; and
- d) exposing said expressed $\Delta 5$ -desaturase enzyme to a substrate polyunsaturated fatty acid in order to convert said substrate to a product polyunsaturated fatty acid.

Claim 20 (withdrawn): The method according to claim 19, wherein said substrate polyunsaturated fatty acid is DGLA or $20:4n-3$ and said product polyunsaturated fatty acid is AA or EPA, respectively.

Claim 21 (withdrawn): The method according to claim 19 further comprising the step of exposing said product polyunsaturated fatty acid to an elongase in order to convert said product polyunsaturated fatty acid to another polyunsaturated fatty acid.

Claim 22 (withdrawn): The method according to claim 21 wherein said product polyunsaturated fatty acid is AA or EPA and said another polyunsaturated fatty acid is adrenic acid or (n-3)-docosapentaenoic acid, respectively.

Claim 23 (withdrawn): The method of claim 21 further comprising the step of exposing said another polyunsaturated fatty acid to an additional desaturase in order to convert said another polyunsaturated fatty acid to a final polyunsaturated fatty acid.

Claim 24 (withdrawn): The method of claim 23 wherein said final polyunsaturated fatty acid is (n-6)-docosapentaenoic acid or docosahexaenoic (DHA) acid.

Claim 25 (withdrawn): A method for producing a polyunsaturated fatty acid comprising the steps of:

- a) isolating a nucleotide sequence selected from the group consisting of SEQ ID NO:13 and SEQ ID NO:32;
- b) constructing a vector comprising said isolated nucleotide sequence;
- c) introducing said vector into a host cell for a time and under conditions sufficient for expression of $\Delta 6$ -desaturase enzyme; and
- d) exposing said expressed $\Delta 6$ -desaturase enzyme to a substrate polyunsaturated fatty acid in order to convert said substrate to a product polyunsaturated fatty acid.

Claim 26 (withdrawn): The method according to claim 25, wherein said substrate polyunsaturated fatty acid is LA or ALA and said product polyunsaturated fatty acid is GLA or STA, respectively.

Claim 27 (withdrawn): The method according to claim 25 further comprising the step of exposing said product polyunsaturated fatty acid to an elongase in order to convert said product polyunsaturated fatty acid to another polyunsaturated fatty acid.

Claim 28 (withdrawn): The method according to claim 27 wherein said product polyunsaturated fatty acid is GLA or

STA and said another polyunsaturated fatty acid is DGLA or ETA, respectively.

Claim 29 (withdrawn): The method of claim 27 further comprising the step of exposing said another polyunsaturated fatty acid to an additional desaturase in order to convert said another polyunsaturated fatty acid to a final polyunsaturated fatty acid.

Claim 30 (withdrawn): The method of claim 29 wherein said final polyunsaturated fatty acid is AA or EPA.

Claim 31 (withdrawn): A composition comprising at least one polyunsaturated fatty acid selected from the group consisting of said product polyunsaturated fatty acid produced according to the method of claim 19 or 25, said another polyunsaturated fatty acid produced according to the method of claim 21 or 27, and said final polyunsaturated fatty acid produced according to the method of claim 23 or 29.

Claim 32 (withdrawn): The composition of claim 31 wherein said product polyunsaturated fatty acid is at least one polyunsaturated fatty acid selected from the group consisting of AA, EPA, GLA and STA.

Claim 33 (withdrawn): The composition of claim 31 wherein said another polyunsaturated fatty acid is at least one polyunsaturated fatty acid selected from the group consisting of adrenic acid, (n-3)-docosapentaenoic acid, DGLA and EPA.

Claim 34 (withdrawn): The composition of claim 31 wherein said final polyunsaturated fatty acid is at least one polyunsaturated fatty acid selected from the group consisting of (n-6)-docosapentaenoic acid, docosahexaenoic (DHA) acid, AA and EPA.

Claim 35 (withdrawn): A method of preventing or treating a condition in a patient caused by insufficient intake of polyunsaturated fatty acids comprising administering to said patient said composition of claim 31 in an amount sufficient to effect said prevention or treatment.

Claim 36 (currently amended): An isolated nucleic acid sequence ~~comprising or complementary to a nucleotide sequence~~ encoding a polypeptide ~~having desaturase activity,~~ wherein ~~the amino acid sequence of~~ said polypeptide: 1) has at least 70% ~~amino acid~~ sequence identity to ~~an amino acid sequence comprising~~ SEQ ID NO:14; and 2) has a third histidine box motif consisting essentially of QXXHH; and 3) encodes a functionally active Δ 6-desaturase.